

REMARKS

This Response seeks to place this application in condition for allowance. In response to the Examiners request regarding associated litigation or protest (OFFICE ACTION, page 2); the undersigned, at this time, has no knowledge of any litigation or protest involving the original patent of the instant reissue application.

Claims 1-62 are pending. Some of the pending claims have been amended. All of the Examiner's rejections have been addressed below. No new matter has been added.

OFFICE ACTION

In the Office Action mailed April 24, 2002 (hereinafter, the "OFFICE ACTION"), claim 34 was rejected under 35 USC 112, second paragraph as being indefinite, claims 18-57 were rejected under 35 USC 251 as being improper recapture of claimed subject matter, and all of the pending claims were rejected under 35 USC 103(a) as being "unpatentable over Grabbe in view of Ritchie, Ahiskali, Pollmeier, Canning, Goodman, Feldman, Thompson, Sanwo, Bousman and Inacker" (OFFICE ACTION, page 3).

The rejections are addressed separately below.

Amendments to the Claims

Applicants have amended certain claims to provide for improved clarity in the claim language, to improve or maintain antecedence for certain claim language and/or to more particularly point out and distinctly claim the subject matter. All amendments are presented herein with markings relative to the original patent.

Although not required, for the convenience of the Examiner, Applicants have provided

in Appendix A, a version of the claims with marking to show deletions and insertions to the claims relative to the previous amendment. No new matter has been added. Examples of support for the amended claims are included in Appendix B:

Applicants note the Examiners comment regarding claim 1 on page 2 of the OFFICE ACTION, i.e., "it is noted that claim 1, lines 7, 8 appear to be readable on Fig 5 traces 20 only if the outermost ones S and G are excluded." The language of claim 1 in its original or amended form does not exclude the specific embodiment illustrated in Fig. 5. Claim 1 has been amended and now recites a "plurality of bus conductors including first and second groups... each bus conductor of the first group is positioned in an interleaved configuration with each bus conductor of the second group".

35 USC 112 Rejection

In the OFFICE ACTION, Claim 34 was rejected under 35 USC 112, second paragraph as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Applicants have amended the claim dependency of claim 34 to improve antecedence and clarity. No new matter has been added.

35 USC 251 Rejection

In the OFFICE ACTION, claims 18-57 were rejected under 35 USC 251 as being an improper recapture of claimed subject matter deliberately canceled in the application for the patent upon which the present reissue is based. In particular, starting on page 3 of the OFFICE ACTION:

To overcome prior art applicant added claim 36 which included arrangements of bus

bar groups in a certain "interlaced" order. See argument on page 6, lines 17-21. This argument was presented to overcome the prior art. Omission of such aspect in any newly added claim amounts to recapture of material surrendered in the original prosecution.

It should be noted that, although pending (independent) reissue claims 40 and 47 were included in the rejection under 35 USC 251, the Examiner's remarks regarding impermissible recapture do not address or even make any mention of these claims. For completeness, Applicants address claims 40 and 47 below in view of the rejection under 35 USC 251.

Applicants respectfully disagree that any of the pending claims added in the reissue application are subject to impermissible recapture. The comments made on page 6, lines 17-21 of the December 14, 1998 Amendment¹ appear to be nothing more than a paraphrasing of a portion of claim 36.

However, in order to advance the prosecution of the instant application, Applicants have amended certain claims to include matter referenced in Applicants remarks from the December 14, 1998 Amendment, e.g., "missing in Pond is any teaching or suggestion of a second type of bus conductors which are adapted to be electrically coupled to a ground plane through a number of electrical contact elements disposed along their lengths, as is recited in claim 36".

For example:

¹ In the OFFICE ACTION, on page 3, the Examiner refers to "page 6, line 17-21", which appears to be a reference to the Amendment dated December 14, 1998 entered in Application serial No. 08/897,788 corresponding to the Patent for which this reissue application is sought (hereinafter, "the December 14, 1998 Amendment").

Claim 18, in its amended form includes, in part:

a plurality of signal lines including a first group of signal lines interleaved with a second group of signal lines,... wherein the second group of signal lines includes a number of electrical contact elements disposed along the length of each signal conductor of the second group of signal lines, each electrical contact element being adapted to couple to a ground plane node of the substrate.

Claim 47, in its amended form includes in part:

the plurality of signal conductors include a group of signaling lines that are interleaved with a group of ground lines, each ground line of the group of ground lines including a plurality of electrical contact elements electrically coupled to a ground plane

Claim 40, in it's amended form includes in part:

ground conductors that extend through the connector housing parallel to and interleaved with the signal conductors, the ground conductors each including a plurality of contact regions to electrically couple to a ground reference of the substrate, the ground conductors and signal conductors being disposed within the connector housing such that each of the signal conductors is adjacent at least one of the ground conductors.

Thus, Applicants submit that claims 18-57 contain no subject matter that has been improperly recaptured.

35 USC 103(a) Rejection

In the OFFICE ACTION, all of the pending claims were rejected under 35 USC 103(a) as being "unpatentable over Grabbe in view of Ritchie, Ahiskali, Pollmeier, Canning, Goodman, Feldman Thompson, Sanwo, Bousman and Inacker" (OFFICE ACTION, page 3). Applicants respectfully disagree.

It should be noted that, although not separately addressed herein, dependent claims 2-17, 19-39, 41-46, and 48-62 incorporate limitations that present patentable subject matter in their own right. In short, these limitations are also not obvious in view of the matter cited in the aforementioned rejections. However, in an attempt to present a more concise response to the OFFICE ACTION, only certain limitations or elements of independent claims 1, 18, 40 and 47 are discussed below. No inference or conclusion of any kind should be drawn from the absence of comments pertaining to other limitations or elements, whether those limitations or elements are contained in independent or dependent claims.

Finally, it should be noted that, although pending (independent) reissue claims 40 and 47 were included in the rejection under 35 USC 103(a), the Examiners does not address or even make any mention of these claims in view of this rejection. For completeness, Applicants address claims 40 and 47 below in view of the rejection under 35 USC 103(a).

Claims 18 is not Obvious in view of the Cited References

Applicants submit that claim 18 (in its amended or pre-amended form) is not obvious.

Particularly, in the OFFICE ACTION (page 3), the Examiner cites:

For claim 18 the Feldman assembly includes a socket 50 with slots 68 for busbars for "signal" transmission in view of Ritchie, abstract, line 7 Pollmeier, signal bus lines 13a, 13b, etc and Canning at 24. Also, obvious to connect the busbar ends

to traces on the circuit board, it being typical to 50 [sic] connect busbar ends as in Feldman at 46, and Ahiskali. In addition, if the basic Grabbe system were used with a socket having only two slots and two busbar pcb connections 28 these connections would be at the ends of the busbar. Such system would be readable an [sic] claim 18.

Also, obvious to use busbars of Ritchie, fig 9 type.

Claim 18 is directed towards a socket for providing an electrical interface between a substrate and a plurality of removable electronic components. Claim 18, as amended, recites in part:

a plurality of signal lines including a first group of signal lines interleaved with a second group of signal lines... wherein the second group of signal lines includes a number of... electrical contact elements being adapted to couple to a ground plane node of the substrate

Applicants submit that Feldman, in view of Ritchie, Pollmeier, Grabbe, and/or Canning, alone or in combination does not render the above mentioned claim limitations obvious. These references, alone or in combination, do not describe, motivate or suggest a socket having a first group of signal lines interleaved with a second group of signal lines that include a number of electrical contact elements to couple to a ground plane node of the substrate.

Pollmeier and Canning, to the extent understood, each describe conventional "backplane" systems, in which a bus, constructed from traces disposed on a "backplane" substrate or motherboard, are connected to individual sockets, each individual socket dedicated for electrically interfacing an electronic component to the bus. Typically, the

conventional "backplane" substrate featured a number of layers to provide signaling/ground/power². For example, Pollmeier describes:

According to FIG. 3, the signal lines are on the left-hand outer layer. The right-hand outer layer is used for the voltage supply 15 ... Signal ground 14 and voltage supply 15 have, from the point of view of the signal lines 13a, predominantly the same layout... In FIG. 4, an alternative embodiment is shown in which the signal lines are arranged in the center. (see col. 4, lines 30-44 and figs. 3 and 4.)

Further, at least one of these layers of the substrate includes the signal traces that form the bus. Individual contacts in each dedicated socket connect to a signal trace (e.g., through a via). In addition, other vias connect contacts from individual sockets to, for example, a ground plane. For example, Pollmeier, additionally describes:

Shown in FIG. 1 is a backplane 10 which, ... is shown with only three connector strips 11a, 11b, 11c and eight contacts per connector strip. The terminals S are signal contacts which are in each case connected to one another via signal lines 13a, 13b, 13c, 13d. The terminals G serve as ground terminals and are connected to one another via ground connections. (col. 3 lines 16-22, and Fig. 1)

As another example, Canning describes:

The signal lines of the multi-layer backplane are microstrip transmission lines formed by etched traces over a ground plane or over a voltage plane depending on whether

² While certain claims of the instant application are directed to sockets, electrical connectors or signaling systems, these remarks should in no way be interpreted as disclaiming or limiting the claims, for example, to applications that exclude the conventional multi-layer types of "backplanes" or motherboards described in the cited references. Indeed, the sockets, electrical connectors and/or signaling system, as is recited in the claims, is/are contemplated for combination with and/or use such conventional multi-layer "backplanes", motherboards or other types of substrates, for example, as is described in the cited references.

the traces are on the inside face 14 or the outside face 13 of the board. (col. 5, line 65, to col. 6, line 1)

Thus, in each of the systems described in Pollmeier and Canning, separate planes, or laminate layers residing within the substrate or motherboard, are provided for ground potential, signal lines (or bus lines) and/or power supply potential. Individual sockets are dedicated to each removable electronic component, each individual socket including vias to connect contacts within each socket to a signal trace or ground/power plane within the substrate or motherboard.

Feldman, to the extent understood, is directed to a single unitary mating pair of connectors and is typical of the conventional approach of coupling electronic components to each other or to a bus by providing a dedicated connector interface for each electronic component that is to be coupled to the bus.

Fundamentally, each of Feldman, Pollmeier and Canning teach away from the aspect of providing a socket including a signal conductor having a plurality of contact regions to couple to counterpart contact regions disposed on a plurality of removable electronic components, since these references provide a dedicated connector interface for coupling each electronic component. In these references connection means is provided for each contact within the "dedicated" socket to connect to a signal trace or ground/power plane external to the connector.

Ritchie, to the extent understood, is directed to a "bussing connector... for inter-connecting a plurality of printed circuit boards... by means of simple blanked metal strips loaded into an appropriate housing." (Ritchie, lines 1-4 of the abstract).

Ritchie, like Feldman, Pollmeier and Canning, provides no disclosure of a socket including a first group of signal lines interleaved with a second group of signal lines, the second group of signal lines including a number of electrical contact elements to couple to a ground plane node of the substrate.

Thus, Applicants submit that Feldman, in view of Ritchie, Pollmeier, Grabbe, and/or Canning, alone or in combination does not render the above mentioned claim limitations obvious, since none of these references, alone or in combination, describe, motivate or suggest a socket having a first group of signal lines interleaved with a second group of signal lines that include a number of electrical contact elements to couple to a ground plane node of a substrate.

Thus, for at least these reasons, claim 18 is not rendered obvious in view of the cited combination of Feldman, Ritchie, Pollmeier, Grabbe and/or Canning.

Claim 1 is not Obvious in View of the Cited References

Applicants submit that, for at least the same reason as is recited above with respect to claim 18, claim 1 (in its amended or pre-amended form) is not rendered obvious in view of the cited references. Particularly, in the OFFICE ACTION (page 4), the Examiner cites:

For claims 1-[16, the] above discussion is applied with (for claim 1) each bus electrically joined to the pcb only by two posts arranged at busbar ends and the ground bus being joined to a ground plane by posts as in Goodman at 90 or Feldman at 50, 50 [sic] or Pollmeier at 14. The posts at the busbar ends as in Feldman would be readable as being disposed along its length.

Like the Pollmeier and Canning references discussed above, Goodman is directed to a connector featuring a dedicated individual slot to receive a circuit board. In Goodman, a "grounding bus is extended lengthwise in the housing below the circuit board receiving slot" (Abstract, line 4).

Amended Claim 1 is directed to an electrical connector and recites, in part:

each bus conductor of the plurality of bus conductors having a number of compliant contact regions to provide electrical coupling points for like contact regions of electrical devices to be received within the connector, ... each bus conductor of the first group is positioned in an interleaved configuration with each bus conductor of the second group ... the bus conductors of the second group each being adapted to be electrically coupled to an electrical ground plane associated with the circuit board through a number of electrical contact elements disposed along each bus conductor of the second group.

Goodman does not include, among other things, a connector including bus conductors having a number of compliant contact regions to provide electrical coupling points of electrical devices to be received within the connector. Rather Goodman describes that, "Signal contacts in the housing are mounted in the plated through holes in the mounting board which are connected to the signal traces [located on the mounting board]" (e.g., see Goodman Abstract)

At the very least, Feldman and/or Goodman in view of Ritchie, Pollmeier, Grabbe, and/or Canning, alone or in combination does not render the above mentioned claim limitations obvious, since none of these references, alone or in combination, describe, motivate or suggest an electrical connector including bus conductors of a first group positioned in an interleaved configuration with each bus conductor of a second group that are

adapted to be electrically coupled to an electrical ground plane associated with a circuit board through a number of electrical contact elements disposed along each bus conductor of the second group.

Claim 40 is not Obvious in View of the Cited References

Applicants submit that, for at least the same reason as is recited above with respect to claim 18, claim 40 (in its amended or pre-amended form) is not obvious under 35 USC 103(a). Claim 40, (as amended) is directed to an electrical connector and recites, in part:

ground conductors that extend through the connector housing parallel to and interleaved with the signal conductors,...the ground conductors and signal conductors being disposed within the connector housing such that each of the signal conductors is adjacent at least one of the ground conductors.

At the very least, the cited references, alone or in combination does not render the above mentioned claim limitations obvious, since none of these references, alone or in combination, describe, motivate or suggest an electrical connector including ground conductors that extend through the connector housing parallel to and interleaved with signal conductors, each of the signal conductors being disposed within the connector housing and being adjacent at least one of the ground conductors.

Claim 47 is not Obvious in View of the Cited References

Applicants submit that, for at least the same reason as is recited above with respect to claim 18, claim 47 (in its amended or pre-amended form) is not obvious under 35 USC 103(a).

Claim 47, (as amended) is directed to a signaling system and recites in part:

a substrate including a first plurality of signal conducting traces and a second plurality of signal conducting traces;
a socket mounted to the substrate ... including a plurality of signal conductors that extend through the housing in a direction transverse to the slots, ... and wherein the plurality of signal conductors include a group of signaling lines that are interleaved with a group of ground lines, each ground line of the group of ground lines including a plurality of electrical contact elements electrically coupled to a ground plane.

At the very least, the cited references, alone or in combination does not render the above mentioned claim limitations obvious, since none of these references, alone or in combination, describe, motivate or suggest signaling system including a socket including a group of signaling lines that are interleaved with a group of ground lines, each ground line of the group of ground lines including a plurality of contact elements electrically coupled to the ground plane.

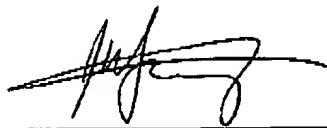
Conclusion

Applicants request reconsideration of the instant application in view of the foregoing remarks and amendments. Applicants submit that the pending claims present patentable subject matter. Accordingly, allowance of all of the claims is respectfully requested.

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Rambus Inc.
4440 El Camino Real
Los Altos, CA 94022
650-947-5336

Respectfully submitted,



Jose G. Moniz
Reg No. 50,192

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Appendix A: Version of the Reissue Claims with Markings to show Amendments
made with respect to the most Previous Amendment

18. (Amended) A socket for providing an electrical interface between a substrate and a plurality of removable electronic components, the socket comprising:
a socket housing adapted to receive the plurality of removable electronic components; and
a plurality of signal lines including a first group of signal lines interleaved with a second group of signal lines, wherein the first group of signal lines includes a first signal conductor extending through the socket housing and having a predetermined impedance and first and second ends adapted to couple respectively to first and second traces disposed on the substrate such that the first signal conductor forms a signal transmission line between the first and second traces, the first signal conductor further having a plurality of electrical contact regions to couple to counterpart electrical contact regions disposed on the plurality of removable electronic components, and wherein the second group of signal lines includes a number of electrical contact elements disposed along the length of each signal conductor of the second group of signal lines, each electrical contact element being adapted to couple to a ground plane node of the substrate.
19. (Amended) The socket of claim 18 [further comprising additional signal conductors extending] wherein additional signal lines of the first group of signal lines extend through the socket housing parallel to the first signal conductor, the additional signal conductors each having the predetermined impedance and first and second ends adapted to couple to a respective additional pair of traces on the substrate such that each additional signal conductor forms a signal transmission line between the additional pair of traces, each additional signal conductor further having a plurality of electrical contact regions to couple to additional counterpart electrical contact regions disposed on the plurality of removable electronic components, the first signal conductor and the additional signal conductors forming a signaling bus that extends through the socket housing.
20. (Amended) The socket of claim 18 [further comprising] wherein the second group of signal lines include a first ground conductor extending through the socket housing and disposed adjacent the first signal conductor, the first ground conductor having a plurality of contact elements

disposed along its length to couple the first ground conductor to [a] the ground plane of the substrate.

21. (Amended) The socket of claim 20 [further comprising] wherein the first group of signal lines include:

additional signal conductors extending through the socket housing in a direction parallel to the first signal conductor, the additional signal conductors each having the predetermined impedance and first and second ends adapted to couple to a respective additional pair of traces on the substrate such that each additional signal conductor forms a signal transmission line between the respective additional pair of [distinct] traces, each additional signal conductor further having a plurality of electrical contact regions to couple respectively to additional counterpart electrical contact regions disposed on the plurality of removable electronic components, the first signal conductor and the additional signal conductors forming a signaling bus that extends through the socket housing;

wherein the second group of signal lines include additional ground conductors extending through the socket housing parallel to the first ground conductor, each of the additional ground conductors having a plurality of contact elements located along its length to couple to a ground plane of the substrate; and

wherein signal conductors, including the first signal conductor and the additional signal conductors, and ground conductors, including the first ground conductor and the additional ground conductor, are disposed within the socket housing such that each of the signal conductors is adjacent a respective one of the ground conductors.

33. (Amended) The socket of claim 18 [further comprising:] wherein the additional signal conductors of the first group extend [extending] through the socket housing parallel to the first signal conductor, the additional signal conductors each having the predetermined impedance and first and second ends adapted to couple to a respective additional pair of traces on the substrate such that each additional signal conductor forms a signal transmission line between the additional pair of traces, each additional signal conductor further having a plurality of electrical contact regions to couple to additional counterpart electrical contact regions on the plurality of removable electronic components; and wherein the socket further comprises a plurality of elastomers extending through the socket housing in a direction transverse to the first signal

conductor and the additional signal conductors, each of the elastomers extending beneath at least one electrical contact region of each of the additional signal conductors and beneath least one electrical contact region of the first signal conductor.

34. (Amended) The socket of claim 33 [29] wherein each of the elastomers of the plurality of elastomers is formed from a dielectric material to maintain electrical isolation between the signal conductors, including the first signal conductor and the additional signal conductors.

40. (Amended) An electrical connector comprising:

a connector housing having a plurality of slots to receive removable electronic components; [a plurality of] signal conductors that extend through the connector housing to form a signaling bus, the signal conductors including contact regions to electrically couple the removable electronic components to the signaling bus, each of the signal conductors having first and second ends to couple to respective signal traces on a substrate and having a predetermined impedance; and

[a plurality of] ground conductors that extend through the connector housing parallel to and interleaved with the signal conductors, the ground conductors each including a plurality of contact regions to electrically couple to a ground reference of the substrate, the ground conductors and signal conductors being disposed within the connector housing such that each of the signal conductors is adjacent at least one of the ground conductors.

47. (Amended) A signaling system comprising:

a substrate including a first plurality of signal conducting traces and a second plurality of signal conducting traces;

a socket mounted to the substrate and including a housing with slots formed therein, the socket further including a plurality of signal conductors that extend through the housing in a direction transverse to the slots, each signal conductor of the plurality of signal conductors having a predetermined impedance and being coupled to form a transmission line between a respective one of the first plurality of signal conducting traces on the substrate and a respective one of the second plurality of signal conducting traces on the substrate, and wherein the plurality of signal conductors include a group of signaling lines that are interleaved with a group of ground lines, each ground line of the group of

ground lines including a plurality of electrical contact elements electrically coupled to a ground plane; and

a plurality of electronic components removably inserted into the slots of the socket housing, each of the electronic components including a plurality of contact regions that respectively contact the plurality of signal conductors.

58. (Amended) The signaling system of claim 47 wherein [the socket further includes a plurality of ground conductors that extend through the housing in a direction transverse to the slots in the housing, each of the plurality of ground conductors including] each ground line of the group of ground lines includes a plurality of contact regions to contact the plurality of electronic components.

59. (Amended) The signaling system of claim 58 wherein each [of the plurality of ground conductors] ground line of the group of ground lines is disposed within the housing adjacent at least one of the [plurality of signal conductors]signaling lines of the group of signaling lines, each ground line of the group of ground lines [plurality of ground conductors] and each signaling line of the group of signaling lines [signal conductor]forming a plurality of signal-ground conductor pairs.

Appendix B: Example Support from the Specification for Amended Pending Claims

- Claim 1 column 4, line 45 - column 5, line 6; column 5, line 41 - column 6, line 65; column 7, lines 1-26; column 8, lines 18-24; figures 2, 3A, 3B, 5 and 10;
- Claim 18: column 4, line 45 - column 5, line 6; column 5, line 41 - column 6, line 65; column 7, lines 1-26; column 8, lines 18-24; figures 2, 3A, 3B, 5 and 10;
- Claim 20: column 6, lines 31-65; figure 3B;
- Claim 21: column 7, lines 15-26; column 8, lines 18-24; figures 5 and 10;
- Claim 33: column 5, lines 64-67; column 7, lines 10-12; figure 4
- Claim 34: column 5, lines 64-67;
- Claim 40: column 4, line 45 - column 5, line 6; column 5, line 41 - column 6, line 65; column 7, lines 15-26; column 8, lines 18-24; figures 2, 3A, 3B, 5 and 10;
- Claim 47: column 4, line 45 - column 5, line 6; column 5, line 41 - column 6, line 65; column 7, lines 15-26; column 8, lines 18-24; figures 2, 3A, 3B, 5 and 10;
- Claim 59: column 7, lines 15-26; column 8, lines 18-24; figures 5 and 10;